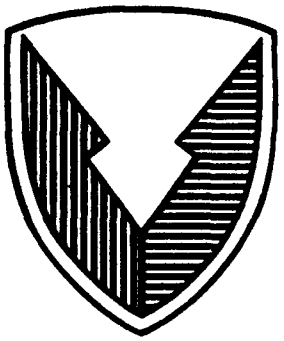


U.S. ARMY MATERIEL COMMAND

SURVEY OF THE MANAGEMENT OF PRODUCTION READINESS REVIEWS

JANUARY 1989

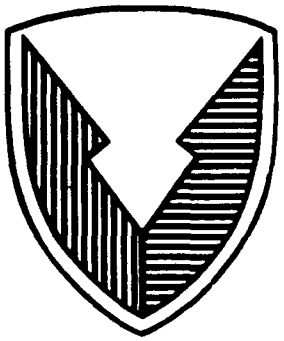
DISTRIBUTION UNLIMITED, DOCUMENT FOR PUBLIC RELEASE

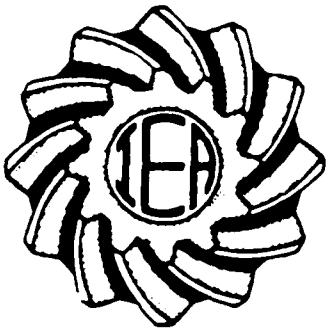
Prepared By

NATIONAL SYSTEMS MANAGEMENT CORPORATION
ALEXANDRIA, VIRGINIA 22312

For

U.S. ARMY INDUSTRIAL ENGINEERING ACTIVITY
ROCK ISLAND, IL 61299-7260





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The Survey of the Management of Production Readiness Reviews provides information relating to the current status of PRR planning, budgeting, staffing and execution in the U.S. Army Materiel Command, the U.S. Navy Naval Air and Sea Systems Commands and the U.S. Air Force. Subjects include DoD, Service and internal activity level publications, PRR team planning, member selection, team size, training, team duration and funding; activities which have performed PRRs; types of PRRs performed; PRR reports, action items and report influence on acquisition milestone decesion making processes; and lessons learned.

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FOREWORD

A critical milestone in the life cycle of systems acquired by the U.S. Armed Forces occurs when research and development efforts are completed and these systems are scheduled for production. The difficulty is in the process of transitioning systems from one environment to another; from the model shop to the factory floor. At issue is industrial readiness; the demonstration of the capability to produce the required quantities of acceptable systems, within cost and schedule limitations.

In 1979, the Department of Defense responded to this issue of transitioning from development to production with direction requiring the conduct of Production Readiness Reviews before approval is granted to proceed with production. This 1988 Survey of the Management of Production Readiness Reviews reports on the degree of success enjoyed by the Services in the implementation of these reviews as part of their acquisition programs strategies.

The author wishes to express sincere thanks to the members of the Army Materiel Command, Naval Air and Sea Systems Commands, Air Force Systems Command and the two service schools who participated in this survey.

TABLE OF CONTENTS

TABLE OF CONTENTS CON'T

TABLE OF CONTENTS CON'T

EXECUTIVE SUMMARY

The 1988 Survey of the Management of Production Readiness Reviews was conducted during August through October of 1988 to determine and report on how the U.S. Army, Navy and Air Force plan, budget, staff and execute Production Readiness Reviews (PRRs). The data and information used to develop this report were solicited from six major subordinate commands of the Army Materiel Command; the Naval Air and Sea Systems Commands; and four activities of the Air Force Systems Command. Two Service schools and six Army Project Management Offices also participated in this survey. The preponderance of information was provided in response to a questionnaire with seven general and 21 technical questions. Additional information for this report was obtained during on-site and telephone interviews.

The results of the survey show that all commands, with the exception of the Army Troop Support Command (TROSCOM), have conducted PRRs. TROSCOM, in coordination with its Belvoir Research, Development and Engineering Center (BRDEC), is developing PRR procedural guidance for BRDEC-managed programs and plans to implement similar procedures for its Natick Research, Development and Engineering Center (NRDEC).

Nineteen of the twenty-eight respondents to the survey have performed PRRs. Of these, 14 are from functional project support offices and five are from Army project management offices. All respondents report endorsement of the PRR concept and view PRR reports as valuable to the decision-making process. These replies indicate that acquisition programs should include the requirements for PRRs.

Also reported is the widespread application of PRR planning activities, training of PRR team members, and careful selection of PRR team chairpersons, team leaders and team members. Normally, Research and Development funds are budgeted for PRR activities. The Army and Air Force reported the occasional use of Procurement or Operations and Maintenance (O&M) funds for these activities. Generally, PRR team staffing requirements include GS-13 to GM-15 grades for chairpersons, with team leaders being one grade lower. Team member grades vary, are more skill dependent, and are normally filled by GS-7 through GS-12 personnel. Small size teams are preferred; however, team size is program dependent and may range from as few as five for small programs to as many as 24 for large programs. PRR on-site duration averages 3 to 5 days, with a high of 14 days for complex programs.

Concerns raised by survey respondents centered on: support and resources for non-major programs; precise data and information exchange between the Government and contractors; the lack of early PRR activity; the need to aggressively pursue PRR action items; how to fit the PRR process into the competitive procurement environment; and the preservation of the PRR process as an independent assessment.

SECTION 1

SECTION 1.0

INTRODUCTION

1.1 GENERAL

This 1988 survey of current Production Readiness Review (PRR) management activities and initiatives summarizes U.S. Army, U.S. Navy and U.S. Air Force planning, budgeting, staffing and execution of PRRs. Within the three Services, PRR activity is concentrated in major subordinate commands of the U.S. Army Materiel Command, in the Naval Air Systems and Sea Systems Commands of the U.S. Navy, and in field activities of the U.S. Air Force Systems Command.

1.2 BACKGROUND

1.2.1 Department of Defense Role

The Department of Defense (DoD) role is to (1) develop and disseminate broad guidance for PRRs assigned by the Under Secretary of Defense for Research and Engineering, (major weapon systems) and (2) to direct the DoD Production Engineering Service Office (DPESO) in assisting DoD components and in assessing production readiness.

1.2.2 Implementation of DoD Policy

On 24 January 1979, the DoD issued DoD Instruction 5000.38, Production Readiness Reviews, one of a series of directives and instructions concerning major system acquisition programs. The intent of DoDI 5000.38 was to formalize the requirement to review producers' capabilities to deliver systems and equipment "without incurring unacceptable risks of breaching thresholds of schedule, performance, cost and other established criteria." PRRs were to be conducted before the start of production, including limited or initial production during Full-Scale Engineering Development. With this direction, the Services were in position to program resources for PRRs of major weapon systems such as strategic and tactical aircraft, ships and submarines, tracked combat vehicles, artillery and missiles. Since 1979, PRRs have become an institutionalized part of the DoD weapon systems acquisition process.

1.2.3 Non-Major Systems

Typically, non-major systems are subsystems of major systems that are critical to mission performance. Also, most systems used to support major systems are in the non-major category. Interest in these smaller, but equally important, systems prompted the Services to include this category in their implementing guidance for PRR preparation and execution.

1.2.4 Non-Developmental Items

Non-Developmental Items (NDI) acquisitions are attractive, cost effective alternatives to costly and lengthy development programs. NDI program experience has generated Service interest in adopting (tailoring) the PRR process to confirm the readiness of producers to meet Service needs for these items.

SECTION 2

SECTION 2.0

THE PRODUCTION READINESS REVIEW PROCESS

2.1 SURVEY OBJECTIVES

The primary objective of this PRR survey was to "determine where we are." For just under ten years, PRRs have been an institutional part of the way DoD does business -- part of the weapons system acquisition program processes. To determine the current status of the PRR process within DoD, it became apparent early on that two important questions needed to be answered: (1) What is the current level of PRR activity?, and (2) What new initiatives are planned for PRR activities? To answer these two questions, we focused on PRR planning, budgeting, staffing, execution, follow-up and lessons learned.

2.2 SURVEY METHODOLOGY

2.2.1 Initial Contacts

The initial task was to identify and establish contact with the organizations and activities that actually perform PRRs: six Army Materiel Command (AMC) major subordinate commands; the Naval Air Systems and Sea Systems Commands; and four Air Force Systems Command field activities. In addition, contact was established with the Office of the Assistant Secretary of the Navy, Shipbuilding and Logistics (OASN S&L); offices at the headquarters of both the Army Materiel Command and Air Force Systems Command; the DoD Production Engineering Services Office (DPESO); and two Service schools -- the Defense Systems Management College (DSMC) and the Army Management Engineering College (AMEC).

2.2.2 PRR Data Sources

Data, information and copies of internally-prepared, PRR-related publications were obtained from the offices actually performing PRRs. PRR management overviews, policies, service directives, regulations and PRR-related course material were solicited from headquarters and service school offices.

2.2.3 Questionnaire Development

To obtain the basic data and commentary needed for the report, a two-part questionnaire was developed for completion by each addressee. The first part was administrative, identifying the respondent, major field of professional responsibility, and categories of systems managed or supported. The second part was technical in nature, with 21 PRR-related questions. These questions covered subjects such as: The availability of DoD, Service-level and internal PRR-related publications; involvement with non-developmental systems; PRR planning groups and PRR teams; categories of PRR funding; training; usefulness of PRR results; applicability of PRR reports to the acquisition program milestone decisions; and lessons learned.

2.2.4 PRR Survey Distribution

The survey questionnaires were forwarded to the PRR points of contact on 18 August 1988. The responses covered a wide spectrum of managerial and technical activities. An informal agreement was reached whereby PRR points of contact

would solicit inputs from supervisory and working-level production engineering personnel and from other offices providing PRR team support, such as logistics and quality assurance.

2.2.5 Army Distribution

Six AMC major subordinate commands responded to the survey, as follows:

2.2.5.1 Armament, Munitions and Chemical Command's (AMCCOM) two development centers responded individually. The AMCCOM Armament Research, Development and Engineering Center (ARDEC) collected inputs from personnel involved with the PRR process and provided a consolidated response reflecting the individual inputs. In addition, ARDEC provided the questionnaire to two project management offices having armament related projects. The Chemical Research, Development and Engineering Center (CRDEC) forwarded all inputs from CRDEC functional-level personnel without further comment or consolidation.

2.2.5.2 Aviation Systems Command (AVSCOM) provided a consolidated headquarters level response.

2.2.5.3 Communications-Electronics Command (CECOM) provided a consolidated headquarters-level response. CECOM also provided two additional responses; one from the Center for Night Vision and Electro-Optics (CNVEO), and the other from the Signals Warfare Laboratory (SWL) to provide full coverage of CECOM PRR activity.

2.2.5.4 Missile Command (MICOM) responded with a command-level response to the PRR survey questionnaire.

2.2.5.5 Tank-Automotive Command (TACOM) provided a command-level response plus separate replies from four project management offices.

2.2.5.6 Troop Support Command (TROSCOM) responded with a TROSCOM Headquarters reply and also provided separate inputs from its two development centers; Belvoir Research, Development and Engineering Center (BRDEC) and the Natick Research, Development and Engineering Center (NRDEC).

2.2.6 Navy Distribution

2.2.6.1 Since the disestablishment of the Naval Material Command, there is no longer a Naval headquarters equivalent to the Army Materiel Command and the Air Force Systems Command. Therefore, two Navy Systems Commands (SYSCOMs) participated in this survey; the Naval Aviation Systems Command (NAVAIR) and the Naval Sea Systems Command (NAVSEA). These two SYSCOMs have the preponderance of PRR-related activity in the Navy. Also, NAVAIR handles most of the procurement for the recently formed Space Warfare Command.

2.2.6.2 NAVAIR and NAVSEA each provided consolidated command-level responses. In addition, OASN S&L requested information copies of the questionnaire.

2.2.7 Air Force Distribution

At the request of the Air Force Systems Command (AFSC), the questionnaire was forwarded directly to AFSC, with information copies to four of its field

activities; Aeronautical Systems Division (ASD), Ballistic Missile Office (BMO), Armaments Division (AD) and Electronic Systems Division (ESD).

2.2.8 Service School Distribution

Information copies of the questionnaire were sent to DSMC and AMEC, two service schools which administer PRR-related course material.

SECTION 3

SECTION 3.0

THE 1988 PRODUCTION READINESS REVIEW SURVEY

3.1 INITIAL SURVEY INFORMATION

Initial information obtained in the course of telephone discussions and during interviews with PRR survey points of contact helped to clarify many responses to the PRR questionnaire and provided an additional opportunity to discuss PRR-related concerns. A summary of the frequently expressed concerns follows:

- The availability of resources to conduct PRRs for non-major systems.
- The real value of PRR reports when factored into the lengthy list of milestone decision review issues.
- The perception of less-than-adequate procedures, or lack of adherence to existing procedures, for tracking and resolving post-PRR follow-up action items.
- PRR reports being of little value without a methodology for problem resolution, or the means for tracking current status of post-PRR action items needed for decision-making.
- The preservation of the PRR process as independent assessments.
- The number of team members comprising a PRR effort.
- The degree of PRR coverage, to include lack of depth in potential problem areas such as subcontractors and past vendors.

3.2 PRR SURVEY COVERAGE

3.2.1 PRR Survey Questionnaire Responses

3.2.1.1 The 1988 survey of PRR activities and initiatives was conducted during August to October 1988. The survey effort was designed to include a wide spectrum of engineering and managerial skills having PRR experience. The hard PRR data for this survey was obtained from 16 separate military and naval organizations out of the 19 activities that have performed PRRs. Of these 16, ten were Army, two were Navy and four were Air Force.

3.2.1.2 Some of the responses were received as consolidated, "command" responses. Other responses were received as "packages" of individual working-level responses, which were consolidated to present a command-wide response to the request for information. Supplementing these written responses, there were many comments, concerns and observations by PRR points of contact, their contemporaries and subordinates that are included in this survey report. The greatest number of responses came from engineering and technical personnel in supervisory and working-level production engineering positions. There were also many responses from quality assurance personnel.

3.2.2 PRR Data Sources

Data and information-gathering efforts were grouped into two categories: (1) general organizations such as DoD (DPESO), major command headquarters, schools, and information addressees, and (2) functional organizations in which direct involvement with PRR activity could be expected. In the latter case, 16 organizations were surveyed: ten Army Material Command major subordinate commands and Research, Development, Test & Evaluation (RDT&E) center offices, two Naval Systems Commands, and four Air Force Systems Command field activities. These organizations have the preponderance of PRR activity within their respective Services, and reflect a cross section of Armed Services weapons and R&D, procurement and logistics support expertise. Additionally, the Naval Systems Commands provide development and procurement support for Marine Corps systems to include PRRs. The organizations or activities were:

ARMY MATERIEL COMMAND

AMCCOM

- Armament Research, Development and Engineering Center
- Chemical Research, Development and Engineering Center

AVSCOM

- Aviation Systems Command headquarters

CECOM

- Communications-Electronics Command headquarters (most C-E commodities)
- Center for Night Vision and Electro-Optics
- Center for Signals Warfare (CSW)

MICOM

- Missile Command headquarters

TACOM

- Tank-Automotive Command headquarters

TROSCOM

- Belvoir Research, Development and Engineering Center
- Natick Research, Development and Engineering Center

In addition, ARDEC requested two project management offices to participate in the survey. TACOM also requested four PMOs to respond, of which three were able to provide data.

NAVY SYSTEMS COMMANDS

- Naval Air Systems Command
- Naval Sea Systems Command

AIR FORCE SYSTEMS COMMAND

- Aeronautical Systems Division
- Ballistic Missile Office
- Armaments Division
- Electronic Systems Division

3.3 SCHEDULING OF PRODUCTION READINESS REVIEWS

3.3.1 Current Scheduling

This survey requested respondents to comment on Initial, PRR I, PRR II, PRR I/II and PRR III activity. The Roman numerals I, II, and III identify PRRs held prior to Milestones I, II and III respectively, the results of which are available as part of the milestone decision processes. When this survey was initiated, PRR activities were applicable to all but the production phase of the acquisition cycle. PRRs were to be scheduled as initial efforts early in the Concept Exploration (CE) phase and were to be conducted prior to each of the three major milestones in the traditional acquisition cycle. Following the completion of Milestone III in the Production phase, PRRs were to be restructured as Production Assessment Reviews (PARs). Similar requirements apply to the Streamlined Acquisition Program cycle; however, PRR I and PRR II activities were to be combined and designated as PRR I/II to accommodate accelerated acquisition programming, reducing the total development time of 10 to 12 years to approximately six years.

3.3.2 Proposed Scheduling

3.3.2.1 During the time frame that this survey was conducted, a new draft Army Regulation (AR) 70-72, Production Readiness Planning and Review, was submitted for review and comment prior to publication. If the new draft AR 70-72 is approved in its present form, it will supersede two existing regulations -- AR 70-67, Production Readiness Reviews, December 1979, and the current version of AR 70-72, Production Management, July 1984. This new draft AR 70-72 contains changes in the number of scheduled PRRs. Instead of three PRRs (one before each major milestone), there will be one or more PRRs during the Full-Scale Development (FSD) phase (before Milestone III, when the decision is made to enter production). If more than one PRR is required during the FSD phase, they will be sequential, e.g., Initial, Interim and Final. In lieu of PRRs for Milestones I and II, Producibility Reviews (PRs) will be performed. This change in no way negates the requirement to address producibility and production issues early in the acquisition cycle, but it does attach a more realistic connotation to the early efforts which need to be undertaken and closely monitored as development programs mature.

3.3.2.2 This PRR survey may have been influenced to some degree by the existence of this new draft. Comments from experienced PRR individuals in all three Services tend to support this proposed change. In the future, efforts to survey the PRR process could indicate a significant drop in the amount of activity reported unless the level of effort is redefined to survey both Producibility Review and Production Readiness Review activities.

3.3.3 Compliance With Review Scheduling

Respondents were asked if their activities were following traditional acquisition cycle program scheduling (DoDD 5000.1 and DoDI 5000.2), streamlined acquisition program scheduling (DoDD 5000.43), or both. Responses indicated almost all respondents employ both forms of scheduling. Interestingly, at the working level a few respondents indicated little knowledge of the differences in scheduling. They should possess some awareness, especially if emphasis is to be placed on the level of effort needed to accommodate a streamlined program with a combined PRR I/II effort.

3.4 RESPONSES TO THE TECHNICAL PORTION OF THE PRR SURVEY

3.4.1 Publications Availability

The first question in the technical portion of the PRR questionnaire asked if any of four publications were available for use. These were:

- DoDI 5000.38, Production Readiness Reviews.
- DoD 4245.7-M, Transition From Development to Production.
- NAVSO P-6071, Best Practices.
- MIL-STD-1528 (USAF), Manufacturing Management Program.

All respondents in senior or supervisory positions indicated the four publications were on hand.

Working-level respondents were senior and mid-level engineers, specialists and technicians. Of these working level responses, replies from personnel in production engineering type positions indicated awareness of these publications. Many responses from personnel in other skill areas, such as quality assurance (QA) or integrated logistics support (ILS), indicated a lack of awareness. Using the "packaged" responses as the sample of working level knowledge, it was apparent that some members of PRR teams were unaware of the purpose of PRRs. Despite the publicity and wide distribution of templates (DoD 4245.7-M) and Best Practices (NAVSO P-6071), risk assessment remains alien terminology to some.

3.4.2 Service Level Publications

With Tri-Service participation in the survey, two questions were asked concerning Service-level directives or regulations pertaining to PRRs, (one for Army respondents and the other for Navy and Air Force respondents). For the Army, almost all respondents in supervisory or higher positions were familiar with AR 70-72 and AMC-R 70-66, both titled Production Management. For Navy and Air Force respondents, the survey questionnaire requested a listing of their

current Service-level directives or regulations implementing DoDI 5000.38, Production Readiness Reviews. The consolidated list for the Navy and Air Force follows:

NAVY

SECNAVINST 4801.1B	Defense Production Management, 17 March 1986.
* NAVMATINST 4801.2A	Production Readiness Review, 7 January 1983.
NAVSEAINST 4800.2A	Readiness for Production, 13 July 1988.

AIR FORCE

AFR 800-9	Manufacturing Management Policy for Air Force Contracts, November 1983.
AFSCR 800-7	Policies and Procedures for Transition from Development for Productivity, August 1985.
AFSCR 84-2	Production Readiness Review, 19 September 1986.
AFSCR 84-4	AFSC Guide for Manufacturing Review, 30 October 1987.
AFSCR 800-9	Manufacturing Management, 12 June 1987.

* The Naval Material Command was disestablished on 6 May 1985. Most PRR functional responsibilities were transferred to the Naval Air and Sea Systems Commands. NAVMATINST 4801.2A is, however, still referred to by NAVSEA for guidance.

3.4.3 Internal Publications

The preceding Service and major command-level publications are generally easy to locate. Copies can be obtained without difficulty unless they are out of print and no longer in stock. However, major subordinate commands, field activities and development centers frequently publish "internal" publications or supplements to Service-level publications, which are tailored to mission needs. These publications, which normally are not widely distributed, consist of regulations, directives, pamphlets, circulars, handbooks, standard operating procedures, and hard (paper) copies of briefing and accompanying text material, and primarily are for instructional purposes. The PRR survey questionnaire requested respondents to provide copies of their internal publications. Publications submitted in response to the request, and brief descriptions, were:

ARMY

SOURCE	NUMBER	TITLE	DATE
AMC	AMC-CIR 70-2	Transition from Development to Production	18 September 87

Directs implementations of DoD 7245.7-M, Transition from Development to Production; NAVSO-P-6071, Best Practices; and announces planned production of an AMC Producibility Engineering and Planning (PEP) guide to supplement and tailor the Transition "templates" and Best Practices.

AMCCOM	AMCCOMR 70-2	Producibility Engineering and Planning	5 May 87

Covers all aspects of PEP assignment responsibilities within AMCCOM, including requirement to perform PRRs. Contains sample Statement of Work (SOW) for PEP, including SOW coverage of contractor/subcontractor PRR responsibilities.

ARDEC	ARDEC XXXX	Production Readiness Review Guide	Undated

Published 4th quarter, 1987. Comprehensive guide, modeled on USAF C-17 transport aircraft PRR program. Detailed instructions, with samples of PRR team forms. Planned revisions will tailor orientation of the guide towards the DoD templates and Navy Best Practices.

CECOM	CECOMR XXXX	Production Management	Undated

Draft, in staffing. Assigns responsibilities including performance of PRRs.

CECOM	EH-4	Managers Guide to Assessing Production Capability at a Contractor's Facility	5 August 1986

Contains typical PRR-related questions to be asked when evaluating five subject areas of production capability and performance.

MICOM	MICOMR 70-33	Production Engineering	27 October 1981

Policy and responsibility assignments for PEP, Initial Production Facility (IPF) and PRRs. Includes PRR review criteria.

TROSCOM	TROSCOMR XXXX	Producibility Engineering and Planning (PEP)/Production Engineering (PE)	Undated

Draft, in staffing. Assigns PEP/PE responsibilities, requires PRRs, and discusses tasks for each acquisition phase.

BRDEC	BRDECHDBK 70-2	Producibility Engineering and Planning (PEP)	June 1988

Emphasis on Technical Data Package (TDP) activities. Chapter 3 is devoted to PRR activities.

BRDEC	BRDECSOP 70-15	Producibility Engineering and Planning (PEP)/ Production Engineering	1 October 1987

Assigns responsibilities for PEP/PE. Contains both traditional and accelerated acquisition-to-production roadmaps, fold out charts, and detailed explanations for PEP/PE activities including PRR activities.

NAVY

SOURCE	NUMBER	TITLE	DATE
NAVAIR	None	Function of AIR-5142F	Undated

Draft NAVAIRSYSCOM AIR-514 assignment of responsibility for the documentation of PRRs and PARs to AIR-5142F.

NAVAIR	None	Production Readiness Review (PRR) Process	Undated

A comprehensive "how to" manual consisting of four major, tabbed sections addressing the PRR process; general PRR information with examples; copies of DoD and Navy PRR-related directives; and functional area criteria. Can be used as course/instructional material.

NAVWESA	None	The PRR/PAR Process	Undated

Hard copies of vugraphs for briefing and instructional purposes. Covers purpose, process and report processes for PRRs and PARs. Includes examples of PRR team forms and action item forms.

NAVWESA	None	Production Readiness Review One on One	Undated

Hard copies of vugraphs for briefing and instructional purposes. Covers eight PRR functional areas. Includes a concise list of "do" and "don't" guidelines for PRR team members.

NAVSEA	NAVSEAINST 4800.2A	Readiness for Production	13 July 1988

Contains NAVSEA policies, procedures and responsibilities for determining production readiness prior to limited or full production. Includes PRR requirements, directs SEA-907 to implement. Discusses all PRR subject area criteria and reports.

AIR FORCE

SOURCE	NUMBER	TITLE	DATE
AFSC	AFSCR 800-9	Manufacturing Management	12 June 1987

Assigns responsibilities and outlines procedures for manufacturing management during acquisition of major systems, subsystems or equipment. Contains tabular breakout of functional requirements including PRR requirements.

AFSC	AFSCPAM 84-4	AFSC Guide for Manufacturing Reviews	30 October 1987

Addresses seven different types of manufacturing reviews, including PRRs. Covers the eight template areas. Directs PRRs in accordance with AFSCR 84-2, and lists in tabular format all PRR areas to be addressed or considered.

AFSCAD	PMD OI 800-5	Guide for Conducting Production Readiness Review	28 June 1988

Contains guidance for AFSC Armaments Division PRR team directors and team members. Covers plans, organization, conduct and close out of PRR action items. Includes sample time schedule, suggested review areas, and sample forms. Outlines contractor responsibilities.

3.4.4 Publications Summary

The survey found:

- PRRs are mandated and institutionalized in all three Services.
- Variations in the approach to PRR activities are minor.
- All three Services require full coverage of all PRR assessment subject areas.
- All three Services already have, or are in the process of adapting, the use of templates and Best Practices for risk assessment.
- All three Services have provided for the tailored integration of PRR activities into the streamlined acquisition process.

3.4.5 NDI-Related PRR Activity

3.4.5.1 One concern repeatedly surfaced during PRR discussions, which was PRR activity as part of the NDI acquisition process. There was general agreement that "full blown" PRRs appear unsuitable for NDI programs. Two reasons were cited: (1) NDI production is, or should be, based on established product lines and production capabilities and capacities, and (2) funding and schedule impact to the NDI process should be minimized. There was also general agreement that some degree of professional producibility /production involvement with NDI program is needed; doing nothing is risky. Experience with NDI programs indicates it is unwise to assume producers can deliver. One of the more frequently expressed reasons was that NDI products may differ from commercial versions. Producers also may need extra capacity to deliver on schedule. Failure to consider these issues could result in serious breaches of funding and schedule thresholds. To learn more about this issue, three questions concerning NDI programs were included in the PRR survey. They are discussed in the following three paragraphs.

3.4.5.2 The first of the three NDI questions asked if production engineering personnel were employed in support of NDI programs. (Positive replies were received from all respondents assigned to offices with NDI programs.) Possible responses to the first question were:

- No, for activities with no NDI program involvement.
- Yes, for those activities with NDI programs.

3.4.5.3 The other two NDI questions were intended to be more thought-provoking. For those respondents responding "yes" to the first question, the second question asked for the key NDI program areas assessed by the production engineering personnel. Responses to this question indicated the degree of emphasis on the quality of technical data package information. Other comments covered examinations of manufacturing plans; fabrication techniques; performance specifications; availability and suitability of commercial and military parts engineering changes; and some involvement in pre- and post-award surveys. Responses indicated that production engineering personnel are quite involved in the engineering and technical "paperwork" portions of NDI program support. The responses to this question also indicated that very few visits are made to NDI production facilities. Because the Army Troop Support Command is still developing PRR guidance, its reply indicated that production readiness reviews will be required for NDI as well as other types of acquisitions.

3.4.5.4 The third question was intended for respondents with a "no" answer to the first question. These respondents were asked to explain activities undertaken to assess the adequacy of NDI producibility and supportability, without confining the question to the application of production engineering skills. Responses alluded to involvement by logistics, production and quality assurance personnel. Supportability was mentioned as a program concern. The Navy (NAVSEA) response did not cite skills; however, its response was more specific in that PRR-oriented personnel were included in program technical reviews, e.g., design, preproduction, logistics and quality.

3.4.6 NDI Market Analysis Activity

Market analysis, a two-step process of surveillance and investigation, consists of (1) the continuous monitoring of the manufacturing sector to maintain awareness of potential NDI producers, and (2) the detailed examination of selected production capabilities which appear most suitable to produce specific non-developmental items. The PRR survey questionnaire did not ask for information regarding the level of producibility or production-related involvement during market analysis activities. When the survey questionnaire was developed, it was not apparent that a separate question was needed to stimulate commentary on this subject. As responses to the survey accumulated, the lack of comments regarding production engineering involvement early in the NDI acquisition program cycle, when considerable market analysis activities are concentrated, became cause for re-examination to determine if additional information should be included in this report. This re-look at production engineering involvement with NDI programs during market analysis activities surfaced additional information related to the PRR process. The summarized points are:

- The level of interest in market surveillance is commodity-dependent; for example, hundreds of electronics firms vs. less than ten motor vehicle producers.

- A tendency to believe that the identification of potential producers belongs elsewhere, e.g., in procurement.

- Information regarding producers may be fragmented -- scattered throughout different offices.

- Listings of available producers may not be up-to-date, examples being changes in corporate ownership, management or product lines.

- Listings may indicate product lines, but may not address production capabilities in sufficient detail to permit assessment.

3.4.7 DPESO Coordination

The next survey question asked if planning activities were coordinated with the Defense Production Engineering Service Office (DPESO), and asked respondents to qualify the response for major/non-major programs. All AMC Major Subordinate Commands (MSCs), the Navy NAVAIR and NAVSEA, and the Air Force AFSC field activities provided positive replies that both major and non-major programs were coordinated with DPESO. Two AMC MSC research, development and engineering centers submitted negative replies; however, their parent organizations (MSCs) did coordinate programs with DPESO.

3.4.8 PRR Planning

Two PRR survey questions requested information regarding PRR planning group activities, the identification of the office that selects team members, and skills needed for appointment to team positions. The first question, in three parts, requested information on the selection of chairpersons, team leaders and team members. All responses indicated that responsibilities were clearly defined; assignments were made by an appropriate level of managerial and engineering expertise; and the required skills were mandated. The following list identifies the organization, planning group or activity that selected the PRR chairperson, team leaders (if required in addition to the chairperson), and team members. N/A denotes Not Applicable.

ARMY

ORGANIZATION	CHAIRPERSON	TEAM LEADER(s)	TEAM MEMBERS
ARDEC	PROJECT/PROGRAM MANAGER	N/A	ACTIVITY TASKED FOR SUPPORT
CRDEC *	ENG. SPT. OFC. ROCK ISLAND ARSENAL	N/A	CONFIGURATION CONTROL BOARD
AVSCOM	PROJECT/PROGRAM MANAGEMENT OFFICE	PRODUCTION ENG DIV & PMO	TEAMLEADER & PMO
CECOM	PRODUCTION TEAM	PRODUCTION TEAM	PRODUCTION TEAM
CNVEOL	DIRECTOR	DIRECTOR	DIRECTOR
CSW	PROJECT PRODUCIBILITY/ PRODUCTION ENG	QA, ENG, CONF. MGT., SAFETY	QA, ENG., CONF. MGT., SAFETY
MICOM	SYS. ENG & PRODUCTION DIRECTORATE	SYS. ENG. & PRODUCTION DIRECTORATE	SYS. ENG. & PRODUCTION DIRECTORATE

TACOM	PROGRAM/PROJECT MANAGEMENT OFFICE	CHAIRPERSON	CHAIRPERSON & TEAM LEADER
TROSCOM **	POLICY UNDER DEVELOPMENT	N/A	N/A
BRDEC	POLICY UNDER DEVELOPMENT	N/A	N/A
NRDEC	N/A	N/A	N/A

* CRDEC missions include support and participation in the Navy Binary Munitions program. PRR support for this program is established by the Navy. CRDEC provides PRR team members to support Navy needs.

** TROSCOM is developing requirements for the performance of PRRs, which will include personnel from TROSCOM, BRDEC, or NRDEC. Personnel will be selected by a proposed centralized producibility engineering planning organization.

NAVY

ORGANIZATION	CHAIRPERSON	TEAM LEADER(s)	TEAM MEMBERS
NAVAIR	PROGRAM MANAGER, PMA PRODUCTION OFFICER	PROGRAM MANAGER PMA PRODUCTION OFFICER	PROGRAM MANAGER, PMA PRODUCTION OFFICER
NAVSEA	N/A	PROGRAM MANAGER	PROGRAM MANAGER & NAVSEA 907

AIR FORCE

ORGANIZATION	CHAIRPERSON	TEAM LEADER(s)	TEAM MEMBERS
ASD	PROJECT MANAGER W/ CONCURRENCE OF PROD. MGT. DIV. CHIEF	CHAIRPERSON	CHAIRPERSON
BMO	DIRECTOR OF MANUFACTURING	DIRECTOR OF MANUFACTURING	DIRECTOR OF MANUFACTURING
AD	PROGRAM DIRECTOR, ASST. DEPUTY FOR MANUFACTURING	PRR DIRECTOR	PRR DIRECTOR
ESD	TEAM DIRECTOR PRODUCTION, LOGISTICS MANUFACTURING	N/A	PRODUCTION, LOGISTICS, MANUFACTURING

3.4.9 PRR Team Selection Comments

The Army requires PRRs to be independent reviews and, during the course of the PRR survey, comments from production engineering personnel were that PRRs should be independent (unbiased) reviews. Additional comments were that

program/project involvement with PRRs should be limited to contractual inclusion of PRR-related requirements; provision of pertinent program information; coordination of PRR events, locations and scheduling; PRR funding; and, as required, on-site liaison personnel from the Project Management Office (PMO). The Army Missile Command has taken this approach with a view that no more than two PMO personnel should be on site during the conduct of PRRs in order to preserve the air of an independent evaluation. In its opinion, this permits the PRR team the freedom to present totally objective and unbiased reports to the command and to program managers.

3.4.10 PRR Team Grade and Experience Requirements

The PRR survey requested respondents to indicate skill levels, preferred grades or ranks, and experiences for PRR team members. This question had three parts: chairpersons, team leaders and team members.

3.4.10.1 Army respondents indicated the need for GM/GS-13 to -15 chairpersons with strong industrial or production engineering backgrounds and previous PRR team experience (preferably in leadership positions.) Team leader requirements typically were one grade lower than for chairperson positions. Team member grade requirements were flexible, ranging from GS-7 to GS-13. The specialized skills and experiences of team members were reported as being more important than grade levels.

3.4.10.2 Navy responses were similar to the Army responses. NAVAIR team member requirements ranged from GS-9 to GS-13; NAVSEA indicated the chairperson position could require a GM-15.

3.4.10.3 Air Force responses also were similar to Army responses. Aeronautical Systems Division also indicated the potential need for a GM-15 chairperson.

3.4.11 Military PRR Team Members

With the exception of one Project Management (PM) office (PM, Mines, Countermines and Demolitions), Army respondents gave no indication of uniformed military participation on PRR teams. The Navy and Air Force did include officer personnel as PRR team members. The Navy recommended a Commander (0-5) for chairperson or team leader positions, and other officers as team members. The Air Force recommended a Lieutenant Colonel (0-5) or Major (0-4) for the chairperson position, a Captain (0-3) as team leader, and Captains or Lieutenants (0-1 to 0-3) as team members. Both the Navy and Air Force required officers to have skill levels and experience similar to their civilian personnel.

3.4.12 PRR Team Size

There was a wide variation in the size of teams. The largest reported team size, provided by the Air Force, was 23 for a missile system PRR. The smallest team size reported by the three Services was five. The survey data indicated a trend for larger teams in the Air Force, mid-size teams for the Army, and small teams for the Navy; however, some Air Force comments indicated a strong preference for smaller teams. All three Services tailored the size of their teams to the complexity of the system scheduled for a PRR. The Army Missile Command reported a typical team size of 12 to 15 persons for initial, interim

and final PRRs and, by way of example, plans to employ approximately 12 personnel for a scheduled Multi-Purpose Incendiary Munitions Project PRR.

3.4.13 PRR Team Funding

3.4.13.1 Almost all respondents reported the obligation of Research and Development (R&D) (6.3-6.4) category funding for contractor and Government PRR activities. In some instances, the term "Project Funds" or "Customer Reimbursement" was reported, still in the R&D funding category. The Army and Navy also reported the limited use of procurement funds and operations and maintenance funds, obligated on a case-by-case basis. R&D funds normally were used for training of PRR Team members; however, there were reports of overhead (internal O&M) funding for this purpose.

3.4.13.2 The survey questionnaire did not request comments regarding PRR funding issues. However, these issues did surface during conversations with Points of Contact (POCs). There was little concern over funding for major systems; generally, dollars could be identified within overall budgets, and adequate management resources were committed to these programs in order to ensure that these requirements were identified in program budget and scheduling documentation. The smaller, non-major programs normally did not enjoy the same level of interest or visibility. Importantly, there was no indication of a lack of concern for producibility and production issues by non-major-system management teams. The most frequently cited problem was the identification of dollars late in the acquisition cycle of those projects which were already short on funds for any number of reasons. Indications were that front-end program funding requirements for PRR activities were recognized. As stated elsewhere in this report, all commands and activities having direct responsibilities for PRRs clearly recognized the importance of producibility and production engineering support to the success of their programs. Training was receiving renewed emphasis as well. Assuming that a lack of recognition in project acquisition strategy for adequate Producibility Engineering and Planning or for separately-defined PRR funding and scheduling is noticed, the PRR funding issue appears to be a lack (or deferral) of dollars. As long as the production engineering staffs must rely on direct or reimbursable R&D funding from the projects they support, some of their work may either be done "at risk" or not be completed. None of these points were made as criticisms of the funding system; they were intended as recognition of realities forced upon the production engineering community. The only suggestions offered were to surface the issue of non-major-system PRR support to (1) convey both interest and concern, and (2) to stimulate continued or new emphasis concerning funding.

3.4.14 PRR Duration

The average period of PRR performance was seven days (two days prior to, and five days for, the actual PRR). In selected cases, PRRs ran up to 14 days. Follow-up activities, such as final report preparation and action item resolution times, were not reported. Discussions and interviews with POCs indicated that some level of involvement could be expected for one to six months.

3.4.15 Risk Assessment Familiarization

The survey attempted to determine if team members were familiar with risk assessment techniques. A review of the responses indicated that personnel in supervisory positions and all but the least experienced production engineering personnel were familiar with these techniques. Responses from working level positions not directly associated with production engineering indicated much less awareness of risk assessment techniques. The survey also indicated that production engineering personnel were familiar with the templates in DoD 4245.7-M, Transition from Development to Production, and in the NAVSO P-6071 Best Practices manual. Personnel in other positions appeared unaware of these publications.

3.4.16 PRR Team Training

The PRR survey requested responses to two questions regarding training -- one on personnel attendance and the other on courses offered. For the Army, AVSCOM reported attendance at the AMEC course. CECOM also held informal seminars and discussion groups; and its Night Vision and Signal Warfare centers also reported attendance at the AMEC course. MICOM, TACOM and TROSCOM all reported attendance at the AMEC course. The Navy and Air Force met training requirements differently. For the Navy, NAVAIR reported no formal training for chairpersons and team leaders; however, briefings were provided to these people. NAVAIR PRR team members received in-house training using locally prepared course material. NAVSEA provided informal training in-house. Three of the four Air Force Systems Command field activities which participated in the PRR survey reported no training. The Armament Division at Eglin AFB offered both on and off-site training.

3.4.16.1 The first question asked if a chairperson, team leader or team member received training. All six AMC Major Subordinate Commands or their Research, Development and Engineering Centers reported the availability of PRR Training. Survey results were:

ARMY

ORGANIZATION	CHAIRPERSON	TEAM LEADERS	TEAM MEMBERS
AMCCOM *	N/A	N/A	N/A
ARDEC	YES	YES	YES
CRDEC	YES	YES	YES
AVSCOM	YES	YES	YES
CECOM	YES	YES	YES
CNVEO	YES	YES	YES
CSW	YES	YES	YES
MICOM	YES	YES	YES
TACOM	N/A	N/A	YES

TROSCOM	YES	YES	YES
BRDEC	YES	YES	YES
NRDEC	N/A	N/A	N/A

* All PRR training was offered by the two AMCCOM RDT&E centers; ARDEC and CRDEC.

NAVY

ORGANIZATION	CHAIRPERSON	TEAM LEADER	TEAM MEMBER
NAVAIR	NO	NO	YES
NAVSEA	N/A	NO	NO

AIR FORCE

ORGANIZATION	CHAIRPERSON	TEAM LEADER	TEAM MEMBER
ASD	NO	NO	NO
BMO	NO	NO	NO
AD	YES	YES	YES
ESD	NO	NO	NO

3.4.16.2 The second question asked respondents to list on- and off-site PRR training courses. The responses to this question included comments on formal and informal briefings, courses of instruction and seminars. AMEC denotes the Army Management Engineering College course on the Management and Conduct of Production Readiness Reviews. Survey results were:

ARMY

ORGANIZATION	TRAINING COURSES
AMCCOM	N/A; TRAINING AT ARDEC AND CRDEC
ARDEC	ON SITE: PRODUCIBILITY COURSES OFF SITE: AMEC, ARMAMENT COMMUNITY RESIDENT ENGINEERING (ACRE)
CRDEC	OFF SITE: AMEC
AVSCOM	ON SITE: INFORMAL SEMINARS AND DISCUSSION GROUPS
CNVEO	OFF SITE: AMEC
CSW	OFF SITE: AMEC

MICOM	ON SITE: AMEC OFF SITE: AMEC
TACOM	OFF SITE: AMEC
BRDEC	ON SITE: PEP GUIDELINES FOR TDP DEVELOPMENT, INTERPRETING GEOMETRIC DIMENSIONING AND TOLERANCING
NRDEC	OFF SITE: AMEC

NAVY

ORGANIZATION	TRAINING COURSES
NAVAIR	ON SITE: PRR PROCESS BRIEFINGS OFF SITE: NAVWPNENGSPT ACTIVITY INTERNAL TRAINING OUTLINE
NAVSEA	N/A

AIR FORCE

ORGANIZATION	TRAINING COURSES
ASD	N/A
BMO	N/A
AD	ON SITE: MANUFACTURING ORIENTATION COURSES, PRE-PRR INSTRUCTIONAL MEETINGS, HOW TO IDENTIFY AND ASSESS RISK OFF SITE: PRODUCTION MANAGEMENT II, DEFENSE MANUFACTURING MANAGEMENT, WORK MEASUREMENT, CONFIGURATION MANAGEMENT
ESD	N/A

3.4.16.3 From the survey results, one important fact stands out; the Army (specifically AMEC) has the only formal PRR course. Comments made by survey respondents during discussions of PRR training indicate: (1) the course is well received; (2) it is taught both on-site at AMEC and off-site at any location with classroom space and a sufficient number of students to warrant the travel and course presentation; and (3) when taught at off-site locations, the AMEC instructors meet face-to-face with the personnel tasked to perform PRRs in the near future and in their working environments. It is a fact that expenditures of travel funds are minimized by sending the instructor to the off-site location rather than sending a large group of students to AMEC. Cost aside, when the trainer can say, "If you can't come here, I will come to you", the opportunities to gain captive audiences greatly improve. During discussions with two POCs from the Navy and Air Force, interest in attending the AMEC course was expressed, primarily because AMEC has tried to draw all the PRR threads together in one series of presentations. The AMEC PRR survey POC also

reports that efforts are underway to update the current course. For the Navy, NAVAIR reported no formal training; however, briefings are provided for all PRR team members, and in-house training is available using locally prepared course material. The in-house training is normally made available to team members -- people new to the PRR process. The survey data from the Air Force is somewhat misleading. Separate courses, such as those taught at Wright Patterson Institute of Technology, do help to equip students for the types of tasks PRR teams confront.

3.4.16.4 Other information which surfaced during this survey and which bears on the issue of training are summarized as follows: (1) Normally, risk assessment techniques are understood by industrial engineers; (2) personnel with other backgrounds often do not understand these techniques; and (3) funding for AMEC attendance by personnel in the other Services can be difficult to obtain.

3.4.17 PRR Reports

The next survey question dealt with PRR reports. The question was prefaced with two background comments concerning: (1) the generation of action items resulting from a PRR; and (2) the use of the PRR report during decision-making processes.

3.4.17.1 The first part of the PRR report question asked how action items were coordinated. Further, it requested respondents to indicate the organizational controls and monitoring responsibilities for their activities. Responses to this question were varied. Generally, respondents expressed concern regarding a lack of post-PRR coordination and follow-up on actions items until resolved; however, all respondents reported control mechanisms in place, some more formalized than others. The reported procedures were:

ARMY

- ARDEC - Project Engineering Office coordinates action items.

- CRDEC - Coordinated by Configuration Control Board members. Development project officer or producibility engineer monitors action items. This may (in the opinion of some CRDEC personnel participating in the survey) be less than adequate. A reason cited for this belief was that producibility functions should be broken out from R&D management.

- AVSCOM - Project management offices control and monitor action items, in part, through program Progress Reviews.

- CECOM - Production team monitors actions. Actions are coordinated with program/project managers. The CECOM reply states, "If issues cannot be resolved, an independent path to the Command Group is available to insure issues are properly addressed."

- CNVEO - Action items are brought to the attention of the project manager or team leader and the corresponding member of the Project/Technical Control Board for contractor resolution.

- CSW - Action items are coordinated by the Producibility/Production Engineering element and administered by project management offices.

- MICOM - Action items are controlled by the Production Engineering Division. Lead production engineers work through project managers to resolve action items.

- TACOM - The PRR chairperson controls and monitors action items.

NAVY

- NAVAIR - Tracking of action items is assigned to Program Management Production Officers (PMPOs) with monthly reports for action item reconciliation. Completed action items return through PMPOs to item originators for concurrence. Items are recycled as required until concurrence is obtained.

- NAVSEA - Action item tracking is similar to NAVAIR procedures.

AIR FORCE

- Aeronautical Systems Division - Action items are monitored by the program office personnel responsible for manufacturing management.

- Ballistic Missile Office - Action items are monitored by the PRR team chief.

- Armaments Division - Action items are monitored by program office personnel.

- Electronic Systems Division - Action items are monitored by the PRR team director and Production Logistics Management personnel.

3.4.17.2 The second part of the PRR report question asked for opinions on the usefulness of PRR reports. Comments were requested concerning the adequacy of PRR coverage and whether or not PRR reports were of significant value as part of the acquisition program decision-making process. There was widespread agreement that the PRR process is adequate (to quote one comment during an interview with production engineering personnel, "It covers all the bases"). Most of the interviewed respondents emphasized their concerns that procedures for follow-up on action items must be in place and followed. A high level of communication and action item coordination is essential to make the total process a success. If the appropriate follow-up is pursued until all action items are resolved, the PRR process (in the opinion of respondents) has great merit in general and is a most worthwhile endeavor.

3.4.18 PRR Report Significance

As to the significant influence or impact on the PRR process of PRR reports, opinions were varied. Generally, the PRR survey results were favorable. Army responses to this question were candid (as intended) and are summarized as follows:

ARMY

- ARDEC - Authoritative, comprehensive PRR must be done, or project manager tends to accept report as a completed milestone. Teams must be qualified, experienced, and motivated to perform PRRs.

- CRDEC - Process is adequate. Improvements are needed in communication and interaction after PRRs, as reported by working level personnel.

- AVSCOM - PRR results are extremely useful.

- CECOM - PRR mechanism is good; however, subsequent production assessment reviews during production should continually address identified risks to insure that they are eliminated or minimized.

- CNVEO - PRRs are very useful to provide "second insight" into overall program progression from development to production readiness status. More information is gained from PRRs than from program reviews.

- CSW - PRR findings are extremely important; they uncover differences between statements of work and drawing package data. Contractor interpretations often are different from that intended by the Government.

- MICOM - PRRs play a significant part in the decision-making process.

NAVY

- NAVAIR - This response is quoted in its entirety: "PRR results are beneficial from both a current and historical standpoint. Across all functional lines the Navy managers can see at a glance the full spectrum of the product environment from problem to exceptional conditions. Also visible are the corrective action for deficiencies and risks associated with production. In all, a PRR is an invaluable open window to a contractor's integrity."

- NAVSEA - This response cites the purposes of PRRs; it tends to lend support to the PRR concept.

AIR FORCE

- AFSC - Reports are critical to the decision process. The most useful result is the identification and resolution of problems, not the reports.

- Aeronautical Systems Division - Very useful. ASD reports a direct relationship between the level of verification of PRR findings and the accuracy of risk assessment; and between the appropriate rating of risks reported to contractors and the success of their follow-up risk reduction efforts.

- Ballistic Missile Office - PRRs document transition, insuring necessary actions are instituted for low-risk production.

- Armaments Division - PRR results are very useful to the System Program Office Director.

- Electronic Systems Division - When conducted incrementally, PRRs are vital for providing insight and progress assessment of contractor manufacturing planning. PRRs provide the program manager with fair and objective assessments of design maturity and production risks.

3.4.19 Candid View of the PRR Process

The next PRR survey question was intended to solicit candid views. It asked if PRRs were adequate for the intended purpose and for recommend changes to improve the process. The responses to this question indicated that the PRR process concept was adequate; however, respondents expressed concerns for the implementation of PRR processes. Examples of these are:

ARMY

- ARDEC - PRRs are often conducted late in the acquisition cycle. This tends to lessen their value since decisions are made without taking PRR findings into account. A full cycle of PRRs should be conducted to resolve problems early. Visits should be made to all involved contractors. This, however, necessitates early selection of contractors.

- CRDEC - The PRR process is adequate provided technical data packages and production planning receive thorough review.

- CECOM - When used aggressively, PRRs provide a mandatory entree that the project manager cannot ignore. Production elements must work closely with the PM, convincing the PM that PRR efforts are beneficial to him and the program.

- CNVEO - As an exception, NVEOL replied "No" to the question.

- CSW - An expressed concern was that PRRs are more important to the Government, but less to the contractors. Contractors want to start production (if possible) with less-than-minimum requirements. The Government should have specific data item descriptions to accentuate government intent and PRR meaning.

NAVY

- NAVAIR - PRRs are both necessary and adequate, but occur too late in the acquisition process. NAVAIR suggests implementation of a formal risk reduction discipline starting in the concept development phase and concluding with a PRR. Add management tracking points during Milestones I & II to make sure all issues and concerns are covered, so that the PRR for Milestone III will confirm the system is ready for production.

- NAVSEA - The NAVSEA response takes a different tack. Without clearly stating an opinion concerning adequacy of PRRs, it appears NAVSEA harbors concern over the late conduct of PRRs. Its response (oriented towards shipbuilding) states, in part, that the "Program Manager would find it a hard task to delay or disrupt production after contract award".

AIR FORCE

- AFSC - PRRs are valuable as technical reviews, less important as management reviews.

- BMO - The Ballistic Missile Office response was that PRRs provide needed coverage and reporting if the frequency of PRR application is correctly applied.

- ESD - The Electronic Systems Division responded that PRR information is not beneficial to management if only one PRR is performed late in the development phase.

3.4.20 Scheduled PRRs - Fiscal Year 1989

Data pertaining to the number of PRRs performed and scheduled was not provided by many PRR survey participants. To determine the estimated level of PRR activity for Fiscal Year (FY) 1989, the six AMC major subordinate command survey participants were contacted. Scheduled PRR activity for FY 1989 is:

- AMCCOM - To be reported by AMCCOM RDT&E Centers (ARDEC and CRDEC).

- ARDEC - Six PRRs scheduled during FY 89.

- CRDEC - Five PRRs scheduled during FY 89.

- AVSCOM - No PRRs during FY 89. New airframe and engine programs are expected to generate considerable PRR requirements within the next two to three years.

- CECOM - Centralized management overview of PRR scheduling has not been completed. Available information is that up to 10 PRRs will be performed during FY 89.

- MICOM - Eight PRRs scheduled during FY 89.

- TACOM - Three PRRs scheduled during FY 89. PRRs are for the Fleet of Military Tactical Vehicles program, the Palletized Loading System, and a modified PRR for the M9 Armored Combat Earthmover.

- TROSCOM - To be reported by TROSCOM RDT&E Centers (BRDEC and NRDEC).

- BRDEC - No PRRs during FY 89. A PRR is planned for the Light Assault Bridge early in FY 90.

- NRDEC - No PRRs during FY 89.

SECTION 4.0

SECTION 4.0

PRR SURVEY SUMMARY

4.1 SURVEY POINTS

The overall purpose of the PRR survey was to determine:

- Whether or not PRRs have been performed.
- If on-going acquisition program planning includes PRR requirements.
- How PRRs are planned, budgeted, staffed and executed.
- How PRR findings are used in the decision-making process.

In the following paragraphs of this section, each of these four points is discussed.

4.2 PRR PERFORMANCE

The 28 respondents to the PRR survey included 12 Service headquarters commands. The PRR survey results for these 12 Army, Navy and Air Force command and field activities are: Five of the six AMC major subordinate commands, two Navy Systems Commands and four Air Force AFSC field activities have performed PRRs; totalling 11 out of 12, or 92 percent. The single command which has not performed PRRs is the Army Troop Support Command. TROSCOM has recognized this requirement and has been coordinating with its Belvoir Research, Development and Engineering Center to establish internal PRR implementing procedures. Following implementation of the TROSCOM-BRDEC PRR procedures, TROSCOM's Natick Research, Development and Engineering Center expects to review the TROSCOM-BRDEC procedures and tailor them as necessary to meet NRDEC needs.

4.3 ACQUISITION PROGRAM PRR REQUIREMENTS

Planning activities in all three Services routinely consider and include PRR requirements during the Full Scale Development phase of the acquisition cycle. Again, 11 of the 12 commands surveyed have included PRR requirements in the past and plan to continue doing so. TROSCOM plans to implement this requirement. Planning activity related to PRR II is less than that for PRR III and even less (often nonexistent) for PRR I. Early in the acquisition cycle, producibility-oriented reviews appear to enjoy much greater favor.

4.4 PRR PLANNING, BUDGETING, STAFFING AND EXECUTION

4.4.1 Planning

Planning activities are normally initiated by production engineering offices, program managers, or both. PE and PM offices monitoring the status of programs entering development, or already in one of the acquisition program phases, also generate the need for PRR planning. A total of 17 Army, Navy and Air Force major subordinate commands, SYSCOMs, field activities and research, development and engineering centers responded as functional PRR organizations. Of these 17, 13 form planning groups. CECOM labels their groups as production teams. The four organizations which do not form planning groups are TACOM,

TROSCOM and the two TROSCOM development centers (BRDEC and NRDEC). TROSCOM reports that PRR planning has not been performed to date, but newly developed procedural guidance includes these activities. BRDEC intends to form planning groups if programs are complex enough to warrant it.

4.4.2 Budgeting

4.4.2.1 PRR budgeting for almost all Army, Navy and Air Force PRR-related activities uses R&D (6.2, 6.3, 6.4) funds. PRR survey data from Army and Navy respondents indicates that a limited amount of their funding for PRRs is received from production and from O&M appropriations.

4.4.2.2 The Army Materiel Command MSCs were contacted separately to discuss two funding-related issues. Two questions were asked to stimulate discussion:

- Do project/product management offices adequately plan early in acquisition cycles for production engineering related support, specifically PRRs?

- Are production engineering support offices experiencing any difficulties in obtaining funds for PRR activities?

4.4.2.3 The summarized responses to the two funding issue questions are:

- AMCCOM - Advanced planning and the availability of funds to perform PRRs have not been problems. In many cases, engineering dollars (R&D) represent a very small percentage (as little as five) of total program costs. Finding dollars for PRR work has only small impact on program costs and is normally approved without any problem. However, another issue was raised concerning the availability of personnel. Apparently, the AMCCOM RDT&E centers (ARDEC and CRDEC) would like to do more PRR work but have been unable to do so due to personnel staffing limitations. The only alternatives to obtaining more personnel are: (1) program funds and bring contractor PRR support on board; or (2) continue attempts at PRR coverage with reduced staffing.

- AVSCOM - Recently, advanced planning activities for PRR work have been receiving emphasis. There has never been much of a planning problem with AVSCOM-managed major systems; however, in the past there were instances of less-than-adequate planning for non-major systems. There was no reported difficulty in obtaining funds for PRR activities.

- CECOM - In the past, there were instances of inadequate planning for PRRs. Recently established review board actions to identify any lack of PR, PRR and PAR scheduling is steadily improving the planning process. Instances of inadequate planning are steadily decreasing. Early and improved communications with project and product managers to get them on board with these requirements also has helped to insure that PRR planning receives appropriate consideration. Funding is not an issue. Early negotiations with project and product managers for the budgeting and fencing of dollars to provide producibility and production engineering support appears to be working, and is a good solution to funds non-availability.

- MICOM - The MICOM procedure of staffing the planning, scheduling and funding requirements with the producibility/production engineering office is

working. Early consideration of PRR planning and budgeting issues is receiving the needed attention. There was one reported budgeting problem for the latter part of Fiscal Year 1988 -- travel funds for PRR teams. Travel dollars were reduced and, as a result, the number of PRR team personnel was reduced in at least one instance. Despite extra efforts by available personnel, there is some risk that PRR coverage might have suffered.

- TACOM - Major systems receive the planning and budgeting support needed, but in one reported instance the availability of dollars posed a problem. During second and third year buys, model changes precipitated a need for additional PRR work. R&D funds either were not programmed or were simply unavailable. Production dollars were used to support the needed PRR work. Problems have persisted with both planning and budgeting for minor systems, especially where secondary systems procurements are concerned. PRR activities were not started until after contract awards. TACOM has given new emphasis to the resolution of PRR planning and budgeting for PRR work. Planning is underway to establish a new Production Directorate to: (1) provide resources for PRR activities; (2) centralize the management of producibility and production activities; and (3) formalize the requirement to examine all proposed system acquisition programs and procurements. In the interim, less formal measures have been taken to increase PRR-related visibility of all TACOM procurements.

- TROSCOM - TROSCOM has no input, since no PRRs have been conducted to date.

4.4.3 Staffing

Staffing guidelines for all organizations which have performed PRRs are essentially the same. Civilian grades for PRR team positions range from GM-15 chairperson to GS-5 engineer/technician/specialist team members. Generally, chairperson positions are either GS-14 or GS-13. If team chief positions are used, they normally are one grade lower -- GS-13 or GS-12. Team member positions usually are from GS-12 down to GS-7. PRR staffing for the numbers of personnel on teams normally runs from a high of fifteen to as few as five. In unusual cases, the Air Force reported team strength of 23 to 24. The Navy responses indicated a preference for smaller teams of five to six members. The Army responses indicate a broader range of five to fifteen, members, depending on project complexity.

4.4.4 Execution

4.4.4.1 PRR execution does not vary greatly. All commands recognize the need to visit subcontractor facilities. MICOM personnel expressed the desire to visit subcontractor facilities first and the prime contractor last. All commands indicated awareness of the need for preliminary coordination between project and production offices, DoD or Service contract administration offices at regional and contractor facility offices, and the contractors. All commands have formal or informal pre-PRR briefings or meetings. All have formal or informal training requirements for chairpersons and team chiefs. There was reported no equivalent PRR course to match the Army Management Engineering College course. The Air Force offers individual subject courses, which can be grouped to provide similar education. In the Navy, internal training is provided to NAVAIR PRR personnel.

4.4.4.2 PRR survey data indicates that PRR duration averages three to five days. For highly complex programs, a PRR can run up to 14 days.

4.4.4.3 All commands express minimal concern regarding on-site (facility) reports for specific PRR subject areas and regarding the PRR reports. Many, however, express the need to either improve or aggressively enforce guidelines to track, monitor and complete action items generated by PRR findings. The resolution of PRR action items appears to be the driver for highly successful PRR exercises. All commands indicate satisfaction with the basic criteria for PRRs.

4.4.4.4 Most commands state that PRR reports are very useful to the decision-making process. Many respondents to the PRR survey expressed concern that PRRs are performed too late in the acquisition cycle (in the latter part of the Full-Scale Development phase) to be of great value in the decision-making process. The survey data also indicated a lack of early PRR activity. There is, however, increased awareness of the need to educate acquisition strategy planners and to share the concern for early activity, especially for producibility issues. The forward approach expressed by AMC major subordinate command production engineering personnel is to review projects early, insert contractual and milestone requirements, and to promote face-to-face encounters with project managers and their key personnel. For the most part, the necessary mechanisms are in place to focus early on producibility and production issues. The need is for early communication and education to stimulate both awareness and the understanding of the benefits to project managers of such early PRR activity.

SECTION 5

SECTION 5.0

PRR LESSONS LEARNED

5.1 SUMMARY OF COMMENTS

The final question in the PRR survey requested participants to share PRR lessons learned and to include them with their responses. Summaries of comments provided in response to this question are contained below.

5.2 ARMY COMMENTS

5.2.1 ARDEC

The reported issue concerns testing. Many items are fielded with minimal testing to prove out design changes, e.g. Engineering Change Proposals (ECPs) and fixes. Also, many items tested in the early stages of development do not have the same configurations as items being type classified; yet, designers consider that early testing satisfies the need.

5.2.2 CRDEC

There is a need for more communication and interaction after PRRs.

5.2.3 AVSCOM

Three lessons learned were provided. The first was in the area of Government/Contractor communications. At the conclusion of PRR exit briefings, a hard copy of vugraphs and supporting narrative now is provided by the Government PRR team chief as an attachment to the report findings, before departing the contractor facility. In this manner, both government and contractor officials have the same information (as was presented at the outbriefing) to preclude any confusion or misunderstandings after the government PRR team members have departed. The second lesson learned involved the lack of a clear and documented understanding of the responsibility for monitoring and controlling action items resulting from IPRR and PRR activities. Although action items were receiving an appropriate degree of attention, performance of most of these tasks was a function of individual initiative. Responsibilities now are fixed within the program/project/product offices. The third lesson learned was in the area of PRR planning. The chief of the AVSCOM Production Engineering Division is assigned the responsibility for PRR planning in concert with respective PMs.

5.2.4 CECOM

Lessons learned were not provided as an attachment to the completed CECOM PRR questionnaire; however, the cover letter to CECOM's response reflects an in-house solution to PRR management problems, and serves well as a lesson learned. The lesson learned is that, for a variety of reasons, PRR management was a fragmented effort, not as well managed and coordinated as it could be. CECOM has recognized the importance of PRRs, and its solution has been to draw all the PRR threads together as part of a reorganization which took place in December of 1987. The CECOM Production and Manufacturing Directorate was formed to house a cadre of production expertise, which also participates in PRR teams headed by the cognizant production project engineers. This also ties the

numerous project and production teams together, further fixing PRR-related responsibilities, and helps to ensure the necessary interaction between project and engineering offices.

5.2.5 MICOM

Six lessons learned were provided by MICOM.

- The first of the MICOM lessons learned concerns PRR team preparations. Time on-site (at contractor and subcontractor facilities) should be minimized. Prior training and familiarization of PRR concepts, goals and procedures, along with specific subject area briefings for specific skills, is an absolute must for a successful PRR.

- The second lesson learned concerns the employment of the PRR team as a "group. Early MICOM PRRs were conducted as a single group, i.e., the entire PRR team was subjected to the evaluations of other, functional groups. This proved to be a less-than-efficient approach. Subsequent PRRs used a "splinter group" evaluation method: groups departmentation by functional areas. Contractor and government personnel assessing the same PRR subject area, such as quality assurance and logistics, are paired in a one-on-one environment. The result of this approach proved to be more efficient and, importantly, provided for a more thorough review.

- The third MICOM lesson learned concerned long lead items. Contractors had tendencies to generalize their statements concerning long lead times for generic groupings (families) of component assemblies or piece parts. Acceptance of these lead time statistics for these groups of parts proved unacceptable. These generalized lead times were average times and could vary greatly when specific long lead items were considered. Current PRR team guidance is to focus on specific item lead times and to ignore trends. This has proven to be of great value in the identification of specific long lead items which, if not targeted for lead time review, could become critical production drivers.

- The fourth lesson learned concerns PRR team examinations of production scheduling. Often, manufacturing or production planning documentation contained rather generalized scheduling information which, if closely examined, either was inadequate or failed to allow for potential schedule problems and slippages. PRR team guidance now requires the investigation of scheduling in enough detail to identify potential problem areas before actual schedule slippages occur.

- The fifth MICOM lesson learned concerns Technical Data Packages. In addition to any government or technical services contractor reviews of TDPs, the MICOM PRR expertise has found it necessary to include a thorough review of TDP work at contractor facilities. This is now done almost routinely.

- The sixth and last lesson learned concerns visits to subcontractors. A perfectly normal assumption might be to visit a prime contractor facility first, followed by visits to subcontractors. This order of visits was tested in reverse: visits were made to subcontractor facilities first, followed by the visit to the prime contractor. This reverse procedure has proved to be most helpful to PRR team members. An immediate benefit is to permit the viewing of raw materials and piece parts at the beginning of the manufacturing cycle -- to

observe the flow of materials used in the finished product in a logical start-to-finish order. Also, subcontractors tend (not in all cases) to be less informed about PRR procedures. The one-on-one exposure between government PRR team members and their subcontractor counterparts provided an up-front opportunity to address PRR purposes (goals) as well as procedures, to clarify any misinterpretations or misunderstandings, and to cultivate candid exchanges of PRR-related information. The data, information and, in particular, actual or potential problems encountered by subcontractors then can be shared between the Government and prime contractor PRR team members during the follow-on visit at the prime contractor's facility. Two important points which were made are: first, the information is fresh in everyone's mind, and second, this approach appears to uncover problems earlier, making them easier to resolve before schedule and cost impacts are incurred to the programs reviewed.

5.3 NAVY COMMENTS

NAVSEA has, as a prime responsibility, the management of large shipbuilding programs. The NAVSEA lesson learned concerns PRR evaluation criteria -- to provide contractors with detailed PRR evaluation criteria well in advance of PRRs. This is to allow contractors ample lead time to prepare NAVSEA "PRR Response Books" with supporting documentation. These advance preparation efforts reduce PRR team time on site and the number of team participants, and permits tailoring of specific team member skill assignments to concentrate on potential problem areas identified during PRR Response Book review. As an additional benefit, this approach provides improved continuity and lists responsibilities for action item accomplishment and closure.

5.4 AIR FORCE COMMENTS

5.4.1 AFSC Ballistic Missile Office

The Ballistic Missile Office has fielded both large and small PRR teams. Its lessons learned concern team size, team member preparation, length of stay, briefings, interviews and reports. The first point to be made was concisely stated: "Small teams are more effective." As a prerequisite to a successful PRR, all team members must thoroughly understand the PRR process, contractor requirements and contractor day-to-day operations. The BMO PRR teams discourage contractor-conducted briefings involving large numbers of PRR team members. The most productive work is accomplished during individual interviews with working-level-contractor personnel. A PRR management approach that works well for BMO teams is to have a mid-point status meeting between the team chief and the contractor counterpart to insure that there are no misconceptions occurring during the on-site PRR. The final point is that, without exception, all team member reports must be complete, adequately documented, and approved by the team chief before leaving the PRR site.

5.4.2 AFSC Armaments Division

The Armaments Division has a lesson learned concerning PRR activity scheduling. Its experience is that it is helpful to insert a PRR key event time schedule into overall program scheduling, e.g., the requirement to write a PRR plan at least 90 days before the start of the PRR.

5.4.3 AFSC Electronic Systems Division

The Electronic Systems Division lesson learned concerns subcontract management. ESD has learned that special attention must be given to subcontract management. A preparatory step to a PRR should be to review contracts between prime and subcontractors to determine and verify, where possible, that all relevant standards, specifications and statements of work were provided (flowdown) to subcontractors. This contract review should also include the evaluation of the prime contractor's means for obtaining management visibility into subcontractor performance.

SECTION 6

SECTION 6.0

PROJECT MANAGEMENT OF PRRS

6.1 PMO DISTRIBUTION

The Army AMCCOM Armament Research, Development and Engineering Center, and TACOM distributed the PRR survey questionnaire to project management offices. Six PMOs, two in response to the ARDEC request and four in response to the TACOM request, participated in the PRR survey. Navy Project Managers for Acquisition (PMAs) and Air Force Systems Project Offices (SPOs) did not participate in this survey.

6.2 PMO STAFFING

Army Project management offices are, by intent, staffed only to perform limited engineering for their assigned projects, and are not equipped to perform all of the detailed engineering and technical tasks required during the development and initial production life cycle phases. The preponderance of the detailed engineering work is done for the PMOs by their supporting "laboratories", also known as RDT&E centers. As a result, much of the information provided by the six PMO respondents also is part of the consolidated responses provided by ARDEC and TACOM offices, where most PRR work is performed. The project manager, however, remains responsible, by charter, for the inclusion of PRR requirements in acquisition strategy, for project schedules, funding requests, PRR related data for contracts, and for coordination with contractors for PRR activities. PMO responses serve as representative views of the PRR processes from the PMO standpoint, add another and important perspective, and fill in some of the management blanks in the total overview of the PRR process.

6.3 PMO PARTICIPANTS

The project management offices which participated in the PRR survey are:

- OPM, Nuclear Munitions.
- OPM, Mines, Countermines and Demolitions.
- OPM, Abrams Tank System.
- OPM, Bradley Fighting Vehicle Systems.
- OPM, M9 Armored Combat Earthmover.
- OPM, Improved Recovery Vehicle System.

6.4 PMO RESPONSES

The following provides a summary of the responses from each of the six PMO participants in the PRR survey.

6.4.1 PM, Nuclear Munitions

This office manages major, non-major, non-developmental and product improvement programs. Both the traditional and streamlined acquisition processes are used. PRRs are performed on each Army-developed major component. Excluded are Department of Energy components which are accepted by the Decision Review and Acceptance Group (DRAAG) process. This PMO forms the PRR teams. The chairperson (GS-15) is from the PMO, and team members (GS-12 through GS-14) are from supporting functional activities. No training is provided. This PMO normally uses RDT&E funding for PRR activities. Some OMA funding also is used, typically for PRR support of product improvement programs (PIPs). PRR report action items are the responsibility of this PMO.

6.4.2 PM, Mines, Countermines and Demolitions

This PMO is responsible for non-major programs using the streamlined acquisition process. The PRR chairperson (Senior Army officer or GS-14 equivalent) and team members are selected by the PMO. RDT&E funding is used. Formal training for all PRR team positions is provided. PRR report action items are coordinated with the PRR chairperson and are monitored by ARDEC. PRR planning activities are coordinated with DPESO.

6.4.3 PM, Abrams Tank System

This PMO has its own technical and production branches. A consolidated summary of the responses from these two PMO branches is provided here. The Abrams Tank System is a major program; however, there are non-major, non-developmental and product improvement program items in the overall system. Both the traditional and streamlined acquisition processes are used. The Abrams PMO plans for PRRs.

6.4.4 PMO, Bradley Fighting Vehicle Systems

This is a major and product improvement program currently using the streamlined acquisition process. Coordination for the major system portion of the Bradley program has been coordinated with the DoD Production Engineering Services Office. PMO Bradley does not perform the PRR planning activities, but the PRR team chairperson is selected by the Project Manager. Currently, Army Procurement funds are used for PRR work. Formal training for PRR team members is available, but has not been used recently except for a chairperson. PRR action items are coordinated by the Bradley PMO.

6.4.5 PM, M9 Armored Combat Earthmover

This is a non-major project following the traditional life cycle acquisition model. This PMO performs PRR planning activities and coordinates with the DoD Production Engineering Service Office. The PM selects the PRR team chairperson. Skill level and experience requirements for team positions are typical of the GS-11 through GS-14 grades. Action officers are assigned to track PRR report action items until they are resolved.

6.4.6 PM, Improved Recovery Vehicle

This PMO is minimally staffed, without current PRR experience, and could not respond to the PRR survey questionnaire.

6.5 PMO MANAGEMENT COMMENTS

This discussion presents a summary of PMO comments concerning PRR management and usefulness as part of the decision-making process.

6.5.1 PM, Nuclear Munitions

PRRs are useful to the decision-making process. This PMO recommends the establishment of risk level definitions. Examples of the three suggested definitions provided by this PMO are: (1) High Risk as, "Redesign as required"; (2) Medium Risk as, "Anomalies occurred, cause known, change accomplished, qualification tests not completed"; and (3) Low Risk as, "All testing not completed, continuation of testing, most testing completed. No anomalies, high confidence that remaining test will be successful".

6.5.2 PM, Mines, Countermines and Demolitions

PRRs are an important factor in the decision-making process.

6.5.3 PM, Abrams Tank System

No criticism was made of the usefulness of PRRs for major procurements; however, concern was expressed regarding minor procurements. A suggestion was offered that Production Engineering should be more involved with minor procurements prior to contract awards. A potential for large cost savings exists by reducing the number of awards of low-dollar procurements to non-qualified contractors.

6.5.4 PM, Bradley Fighting Systems

PRRs are adequate for their intended purpose; however, a suggestion was made that the PRR process might be more objective if the PRR chairperson is from outside the PMO. Also, additional emphasis is needed to closely track PRR report action items. PRR reports and action item status also deserve more emphasis as part of the decision-making process.

6.5.5 PM, M9 Armored Combat Earthmover

The response from this PM office concerns the applicability of PRRs in the current competitive environment. If a different contractor is selected for each acquisition phase, PRRs as currently defined are not applicable. The understanding of the PRR process definition is that: (1) all bidders need to be evaluated; or (2) wait until the contractor is selected. The PRR process is intended to complement and support the current acquisition process which implies that one contractor both develops and produces a system. Realizing that the competitive procurement environment is a de facto situation, it was suggested that additional emphasis be placed on the development of meaningful pre-award evaluations, and in defining technical proposal requirements such that bidders may be disqualified for lack of adequate planning or resources.

SECTION 7

SECTION 7.0

PRR EDUCATION

7.1 SERVICE SCHOOL PARTICIPATION

Two service schools, the Defense Systems Management College and the Army Management Engineering College, were invited to participate in the PRR survey. Their responses differ in that they do not address how they conduct PRRs since these efforts are not part of their missions. One of these schools (AMEC) does, however, provide limited support as observers to PRRs. Both serve as consultants and, most importantly, include the PRR process in their course material. Both schools also are actively working on revisions and expansion of PRR course material.

7.2 DEFENSE SYSTEMS MANAGEMENT COLLEGE

7.2.1 Faculty Observations

All PRR course material provided by the Defense Systems Management College is offered on campus. During an interview at the college, the observation was made that some manufacturers have been using PRR "type" methodologies for 30 years or more in order to determine readiness for production. The implication was that this technique has served well and should be adopted by the Defense community. However, these procedures, developed exclusively for private sector use, were tailored for the manufacture of products to be sold in one or more sectors of the market place. In addition, they were independently developed, with wide variations in application. Furthermore, there was no publicized desire or attempt by manufacturers to standardize procedures. Much can be learned from the accomplishments of industry, but a relatively standardized approach to PRRs, which can be easily understood and applied by producers of defense systems, is needed by DoD.

7.2.2 PRR Education

The DSMC faculty has recognized the need for more emphasis on the subjects of producibility, production, and the processes of transitioning from development to production. Efforts are underway to expand and update course material on these subjects including coverage of producibility, production and assessment readiness reviews.

7.3 ARMY MANAGEMENT ENGINEERING COLLEGE

7.3.1 AMEC Observations

The Army Management Engineering College offers the only formal PRR course with training both on and off campus at military installations (AMETA-C6, 1 week). The on-site training provides AMEC instructors with frequent opportunities for face-to-face encounters with government personnel scheduled for assignment either as PRR team chairpersons or as team members. In addition to occasional PRR participation as observers, AMEC has been requested to provide active support to PRRs. However, limited resources, particularly funding, has prohibited more active participation. Observations provided by AMEC in response to the PRR survey were:

- The adequacy of PRRs depends on careful selection of team chiefs.

- Many PRRs are inadequate because the team chief lacked the necessary experience and training to insure full coverage of PRR issues.

- Importance must be attached to PRR preparation activities.

- PRR preparation needs to begin months, not weeks in advance of the actual PRR.

- All PRR questions need to be developed prior to the PRR.

- Many people know of the DoD 4245.7-M templates and the Navy NAVSO P-6071 Best Practices, but do not know how to use them.

- The templates and Best Practices should be the basis for development of all PRR interviewing plans.

- PRR success depends on personnel selection and training.

- Current attendance levels for AMETA-86 are down, which are a cause for concern.

7.3.2 AMETA-86 PRR Course

The AMETA-86 course is currently Army-sponsored. Personnel in the other services have expressed interest in attending. It may prove easier for them to gain approval to attend if AMETA-86 becomes DoD-sponsored, as are some of the other AMEC courses. AMEC agrees with this approach.

SECTION 8

SECTION 8.0

PRR EXPERT SYSTEM

8.1 INTRODUCTION

The search for new or innovative ways of assessing risk has led to the use of Artificial Intelligence (AI), a computerized technique to analyze PRR results. One of the better examples of artificial intelligence is under development at the Army Missile Command.

8.2 THE MICOM "PRR EXPERT SYSTEM"

8.2.1 System Description

MICOM has designed, and is refining, a "PRR Expert System" with data drawn from DoD, Army, AMC and MICOM internal guidance, the DoD 4245.7-M templates, NAVSO's P-6071 Best Practices, their standard PRR questions, and many many years of in-house PRR experience. Working in the prologue language, this new PRR Expert System will permit data insertion, individual question evaluation, risk assignment, the insertion of variables into the program with a summary for each subject area, plus an overall assessment. For this application, tailored to MICOM commodity and mission needs — the missile business -- MICOM's approach was to focus on seven subject areas:

- Production Design
- Quality Assurance/Test
- Production Engineering and Planning
- Materials and Purchased Parts
- Industrial Resources
- Contract Administration/Program Management
- Logistics

8.2.2 Risk Assignments

For each of the seven subject areas, the summary is designed to show the total number of low, medium and high risk areas and an overall subject assessment. The seven subject areas then are evaluated as a group with an overall program risk assignment.

8.2.3 Program Adaptability

This PRR Expert System is being developed to meet the specialized needs of MICOM for the commodities of systems and equipment for which MICOM is responsible. The program has been designed with flexibility as an important feature. It should not be difficult for other commands, if they have computer programming capabilities and PRR experience, to adapt the program to other commodities.

SECTION 9

SECTION 9.0

CONCLUSIONS

9.1 PRR CONCEPT ACCEPTANCE

The Production Readiness Review concept enjoys wide acceptance, but not without reservations. Differing views of the PRR process are:

- The process is not suitable for small procurements.
- The process was designed for application during the traditional life cycle phases of acquisition, with a single contractor (never more than two or three) developing, and ultimately producing, the system.
- The current competitive procurement environment prohibits early producibility examinations of all prospective producers.
- The producer is not known until after award of the production contract — too late for a meaningful PRR.
- The developer can accomplish only a limited amount of PRR-related work in-house without producers' identification.

9.2 RESOURCES

9.2.1 Major System Resources

As expected, major system acquisition programs enjoy visibility. Planners are attentive to budgeting and scheduling requirements. Generally, planning for PRR resources is adequate, but not entirely so. Unexpected problems with travel budgets force PRR teams to operate at reduced strength. Significant design changes integrated into the product during out-year production frequently warrant additional PRR activity. These activities frequently are not planned as part of design change processes.

9.2.2 Non-Major Systems

Resources to perform non-major system PRRs frequently are nonexistent. Interest in doing this work is not a problem. Until recently, planning was a problem; however, concerted efforts are being made to rectify this situation. People and dollars remain as problems. The people problem can be solved only by: (1) authorizing additional personnel spaces, unlikely in the current austere budget climate; or (2) having portions of this work done by independent private sector personnel. The dollar problem is receiving greater attention, but needs more.

9.2.3 Secondary System Procurements

These procurements receive less-than-adequate PRR support. Resources to monitor these procurements and to provide PRR coverage often are nonexistent. Reviews and updates of Technical Data Packages solve part of the problem. The required product is identified, but producer capabilities are not. Unless the producer has successfully provided similar items in the past for government use, secondary item procurement actions can be risky.

9.3 PRESERVING INDEPENDENCE

There is still a lot of project management office involvement with the PRR process. Project managers select chairpersons or team chiefs. Chairpersons also may be members of the project management team. Project management personnel do play important roles in the PRR process, but should not be members of PRR teams chartered to provide independent assessments.

9.4 TRANSITION

At supervisory levels, problems associated with the transition from development to production generally are understood. The purpose and use of templates (DoD 4245.7-M) and best practices (NAVSO P-6071) also are generally understood. Many working-level personnel subject to detail as PRR team members are unaware of transition process. In addition, many people who are aware of the templates and best practices manuals do not understand how to use them.

9.5 MATRIX MANAGEMENT

Dispersal of producibility and production engineering skills has weakened their influence over acquisition programs. Centralizing these limited resources is proving to be the best approach. Visibility of non-major programs is improving. Awareness of secondary item procurements also is improving. Most importantly, communications are improving.

APPENDIX A

ACRONYMS

ACRE	Armament Community Resident Engineering
AD	Armaments Division
AFR	Air Force Regulation
AFSC	Air Force Systems Command
AFSCR	Air Force Systems Command Regulation
AI	Artificial Intelligence
AIR-XXX	Naval Air Systems Command Office Code Identification
AMC	Army Materiel Command
AMCCOM	Armament, Munitions and Chemical Command
AMC-R	Army Materiel Command Regulation
AMEC	Army Management Engineering College
AMETA	Army Management Engineering Training Activity
AR	Army Regulation
ARDEC	Armament, Research, Development and Engineering Center
ASD	Aeronautical Systems Division
AVSCOM	Aviation Systems Command
BMO	Ballistic Missile Office
BRDEC	Belvoir Research, Development and Engineering Center
CE	Concept Exploration
CECOM	Communications-Electronics Command
CNVEO	Center for Night Vision and Electro-Optics
CONF	Configuration
CRDEC	Chemical Research, Development and Engineering Center
CSW	Center for Signals Warfare
DIV	Division
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DPESO	Defense Production Engineering Service Office
DRAAG	Design, Review and Acceptance Group
DSMC	Defense Systems Management College
ECP	Engineering Change Proposal
ENG	Engineering
ESD	Electronics Systems Division
FY	Fiscal Year
FSD	Full-Scale Development
GM	General Management Civil Service Grade
GS	General Schedule Civil Service Grade (Nonsupervisory)
IEA	Industrial Engineering Activity
ILS	Integrated Logistics Support
IPF	Initial Production Facility
IPRR	Initial Production Readiness Review

MGT	Management
MICOM	Missile Command
MIL HDBK	Military Handbook
MIL-STD	Military Standard
MPBMA	Munitions Production Base Modernization Agency
MSC	Major Subordinate Command
NAVMATINST	Naval Material Instruction
NAVAIR	Naval Air Systems Command
NAVSEA	Naval Sea Systems Command
NAVSO	Navy Staff Office
NAVSEAINST	Naval Sea Instruction
NRDEC	Natick Research, Development and Engineering Center
NDI	Non-developmental Item
N/A	Not Applicable
OASN (S&L)	Assistant Secretary of the Navy (Shipbuilding and Logistics)
OMA	Operations and Maintenance, Army
OPM	Office of the Project Manager
O&M	Operations and Maintenance
PAR	Production Assessment Review
PE	Production Engineer or Engineering
PEP	Producibility Engineering and Planning
PESO	Production Engineering Service Office
PIP	Product Improvement Program
POC	Point of Contact
PM	Project Manager or Management
PMA	Project Manager for Acquisition
PMO	Project Management Office
PMPO	Program Management Product Officer
PR	Producibility Review
PRR	Production Readiness Review
QA	Quality Assurance
RDT&E	Research, Development, Test and Evaluation
R&D	Research and Development
SEA-XX	Naval Sea Systems Command Office Code Identification
SECNAVINST	Secretary of the Navy Instruction
SOP	Standing Operating Procedure
SOW	Statement of Work
SPO	System Project Office
SWL	Signals Warfare Laboratory
SYS	System
SYSCOM	Systems Command (Navy)
TACOM	Tank-Automotive Command
TROSCOM	Troop Support Command
TDP	Technical Data Package

APPENDIX B

POINTS OF CONTACT

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U.S. Army Materiel Command Office of the Project Manager, Mines, Countermines and Demolitions ATTN: AMCPM-MCD Picatinny Arsenal, NJ 07806-5000 POC: Norman Reiter	C: (201)724-7066 AV: 880-7066
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INSTALLATION/POINT OF CONTACT ARMY	TELEPHONE NUMBERS COMMERCIAL (C) AUTOVON (AV)
U.S. Army Materiel Command Office of the Project Manager, M9 Armored Combat Earthmover ATIN: AMCPM-M9-T Warren, MI 48397-5000 POC: Michael J. Bundshuh	C: (313)576-7725 AV: 786-7725
U.S. Army Materiel Command Office of the Project Manager, Improved Recovery Vehicle System ATIN: AMCPM-IRV Warren, MI 48397-5000 POC: Gail Gamez	C: (313)574-5004 AV: 786-5004
U.S. Army Materiel Command Industrial Engineering Activity ATIN: AMXIB-PS Rock Island, IL 61299-7260 POC: Perry C. Reynolds Jim Bruen	C: (309)782-6167 (309)782-7823 AV: 793-6167 793-7823
U.S. Army Materiel Command Army Management Engineering College ATIN: AMXOM-SE Rock Island, IL 61299-7040 POC: Alvin K. Takemoto	C: (309)782-4041 AV: 793-4041
U.S. Army Armament, Munitions and Chemical Command ATIN: AMSMC-DP Rock Island, IL 61299-6000 POC: Jimmy Morgan	C: (309)782-6791/5817 AV: 793-6791/5817

INSTALLATION/POINT OF CONTACT	TELEPHONE NUMBERS COMMERCIAL (C) AUTOVON (AV)
ARMY	
U.S. Army Materiel Command Industrial Engineering Activity ATTN: AMXIB-P Rock Island, IL 61299-7260 POC: James W. Cartens	C: (309) 782-5113 AV: 793-5113
U.S. Army Armament, Munitions and Chemical Command Armament Research, Development and Engineering Center ATTN: SMCAR-TDA Picatinny, NJ 07806-5001 POC: Spencer Hirshman	C: (201) 724-7015 AV: 880-7015
U.S. Army Armament, Munitions, and Chemical Command Armament Research, Development and Engineering Center ATTN: SMCAR-PMP Picatinny, NJ 07806-5001 POC: Richard A. Koppenaal	C: (201) 724-7938 AV: 880-7938
U.S. Army Armament, Munitions, and Chemical Command Armament Research, Development and Engineering Center ATTN: SMCAR-PML-V Picatinny, NJ 07806-5000 POC: Mansueto J. Lalumia	C: (201) 724-6097 AV: 880-6097
U.S. Army Armament, Munitions and Chemical Command Chemical Research, Development and Engineering Center ATTN: SMCCR-TDP Aberdeen Proving Ground, MD 21010-5423 POC: James McKivrigan	C: (301) 671-3126 AV: 584-3126
U.S. Army Armament Munitions and Chemical Command Chemical Research, Development and Engineering Center ATTN: SMCCR-PMI Aberdeen Proving Ground, MD 21010-5423 POC: Kamal Gadde	C: (301) 671-3418 AV: 584-3418

INSTALLATION/POINT OF CONTACT	TELEPHONE NUMBERS COMMERCIAL (C) AUTOVON (AV)
ARMY	
U.S. Army Armament, Munitions and Chemical Command Chemical Research, Development and Engineering Center ATTN: SMCCR-ES Rock Island, IL 61229-7410 POC: Bob Chandler	C: (309)782-5088 AV: 793-5088
U.S. Army Armament, Munitions and Chemical Command Munitions Production Base Modernization Agency ATTN: AMCMC-PBT-I (D) Picatinny, NJ 07806-5000 POC: Bill Donnelly	C: (201)724-4221/5323 AV: 880-4221/5323
U.S. Army Aviation Systems Command ATTN: AMSAV-EM St. Louis, MO 63120-1798 POC: Rube Cline	C: (314)263-2803 AV: 693-2803
U.S. Army Aviation Systems Command ATTN: AMSAV-EMH St. Louis, MO 63120-1798 POC: Dan Haugan Craig Hewett	C: (314)263-2809 (314)263-2801 AV: 693-2809 693-2801
U.S. Army Aviation Systems Command ATTN: AMSAV-EMD St. Louis, MO 63120-1798 POC: Don Doll	C: (314)263-1216 AV: 693-1216
U.S. Army Communications-Electronics Command ATTN: AMSEL-ED Ft. Monmouth, NJ 07703-5201 POC: Colin F. MacDonnell, Jr.	C: (201)532-5193 AV: 992-5193

INSTALLATION/POINT OF CONTACT ARMY	TELEPHONE NUMBERS COMMERCIAL (C) AUTOVON (AV)
U.S. Army Communications-Electronics Command ATTN: AMSEL-ED-T Ft. Monmouth, NJ 07703-5201 POC: Tom Nycz	C: (201) 532-4524 AV: 992-4524
U.S. Army Communications-Electronics Command ATTN: AMSEL-ED-TP Ft. Monmouth, NJ 07703-5201 POC: James Barbarello Charles Johnson	C: (201) 532-5764 (201) 532-5891 AV: 992-5764 992-5891
U.S. Army Communications-Electronics Command Center for Night Vision and Electro-Optics ATTN: ASMSEL-RD-NV-TS Ft. Belvoir, VA 22060-5677 POC: Tom Smith William Jarvis	C: (703) 664-6361 (703) 664-5291 AV: 354-6361 354-5291
U.S. Army Communications-Electronics Command Center for Signals Warfare ATTN: AMSEL-RD-SW-SO VHFS, Warrenton, VA 22186-5141 POC: William F. Horn	C: (703) 347-6368 AV: 249-6368
U.S. Army Missile Command ATTN: AMSI-RD-SE Redstone Arsenal, AL 35898-5240 POC: Dr. Larry Daniel	C: (205) 876-1700 AV: 746-1700
U.S. Army Missile Command ATTN: AMSI-RD-SE-PE Redstone Arsenal, AL 35898-5270 POC: Phillip W. Hodges	C: (205) 895-3468/4147 AV: 742-3468/4147

INSTALLATION/POINT OF CONTACT	TELEPHONE NUMBERS COMMERCIAL (C) AUTOVON (AV)
ARMY	
U.S. Army Tank- Automotive Command ATTN: AMSTA-T Warren, MI 48397-5000 POC: Donald W. Cargo	C: (313)574-6191 AV: 786-6191
U.S. Army Tank- Automotive Command ATTN: AMSTA-1MM Warren, MI 48397-5000 POC: Jamie Florence Ed Borto	C: (313)574-6065 (313)574-8711 AV: 786-6065 786-8711
U.S. Army Troop Support Command ATTN: AMSTR-PP St. Louis, MO 63120-1798 POC: Richard Green	C: (314)263-2672 AV: 693-2672
U.S. Army Troop Support Command ATTN: AMSTR-PPE St. Louis, MO 63120-1798 POC: Gary P. McMichael Julie Sexton	C: (314)263-3417/3418 AV: 693-3417/3418
U.S. Army Troop Support Command Belvoir Research, Development and Engineering Center ATTN: STRBE-TSX Ft. Belvoir, VA 22060-5606 POC: William M. Griffin (Building 327)	C: (703)664-6906 AV: 354-6906

INSTALLATION/POINT OF CONTACT	TELEPHONE NUMBERS COMMERCIAL (C) AUTOVON (AV)
ARMY	
U.S. Army Troop Support Command Belvoir Research, Development and Engineering Center ATIN: STRIBE-TSX Ft. Belvoir, VA 22060-5606 POC: Harry Hodges John M. Pfaffe (Building 327)	C: (703) 664-5127/5128 AV: 354-5127/5128
U.S. Army Troop Support Command Natick Research, Development and Engineering Center ATIN: STRNC-EML Natick, MA 01760-5014 POC: Robert Kelly Stanley J. Salwa	C: (508) 651-4890 (508) 651-4304 AV: 256-4890 256-4304
NAVY	
Office of the Assistant Secretary of the Navy (S&L) RM & QA Directorate Washington, D.C. 20360-5000 POC: W. J. Willoughby, Jr. (CP5 RM 348)	C: (202) 692-9058 AV: 222-9058
Office of the Assistant Secretary of the Navy (S&L) RM & QA Directorate Washington, D.C. 20360-5000 POC: Ernie Renner (CP5 RM 344)	C: (202) 692-1146 AV: 222-1146
Naval Sea Systems Command CODE: SEA 9072 Washington, D.C. 20362-5101 POC: John Bissell (CPK1 RM1102)	C: (202) 746-3111 AV: 286-3111

INSTALLATION/POINT OF CONTACT	TELEPHONE NUMBERS COMMERCIAL (C) AUTOVON (AV)
NAVY	
Naval Air Systems Command CODE: AIR 514 Washington, D.C. 20361-5140 POC: Capt Robert C. Bondi (CG1)	C: (202) 692-7270 AV: None
Naval Air Systems Command CODE: AIR 514 Washington, D.C. 20361-5140 POC: Robert Jacobs (CG1 RM920)	C: (202) 692-0348/0167 AV: 222-0348/0167
Naval Weapons Engineering Center Washington Navy Yard CODE: ESA-GOD (Robert Jacobs) Washington, D.C. 20374-2203	MAIL ADDRESS ONLY
AIR FORCE	
Department of the Air Force ATTN: HQ AFSC/PLM Andrews AFB, MD 20334-5000 POC: Charles Hooper Gary A. Powell Thomas Topolski	C: (301) 981-3408 (301) 981-6613 AV: 858-3408 858-6613
Department of the Air Force ATTN: HQ AFSC/PLE Andrews AFB, MD 20334-5000 POC: Maj. George Fryback Maj. George Noyes	C: (301) 981-2751 AV: 858-2751

INSTALLATION/POINT OF CONTACT	TELEPHONE NUMBERS COMMERCIAL (C) AUTOVON (AV)
AIR FORCE	
Department of the Air Force ATTN: ASD/PMD WPAFB, OH 45433-6503 POC: Col. Roger Alexander Jim Pitstick	C: (513)255-4094 (513)255-7742 AV: 785-4094 785-7742
Department of the Air Force HQ Ballistic Missile Office (AFSC) ATTN: BMO/AWM Norton AFB, CA 92409-6468 POC: Richard E. DeSanze	C: (714)382-7121/6717 AV: 876-7121/6717
Department of the Air Force ATTN: AD/PMD Eglin AFB, FL 32542-5230 POC: Reggie Lewis Cleophus McIntosh	C: (904)882-3876 (904)882-4790/3876 AV: 872-3876 872-4790/3876
Department of the Air Force ATTN: ESD/PLM Hanscom AFB, MA 01731-5000 POC: Bernie Lavoie Mark Siewers	C: (617)377-3540/1 (617)377-3336 AV: 478-3540/1 478-3336
DoD	
Director DoD Production Engineering Services Office c/o Defense Logistics Agency ATTN: DPESO-XB Cameron Station Alexandria, VA 22304-6183 POC: Roger N. Koren	C: (703)756-8994 AV: 289-8994

INSTALLATION/POINT OF CONTACT	TELEPHONE NUMBERS COMMERCIAL (C) AUTOVON (AV)
Defense Systems Management College ATTN: Technical Management Department Fort Belvoir, VA 22060-5426 POC: Jack McGovern	C: (703) 664-3265/3477 AV: 354-3265/3477
Defense Systems Management College ATTN: Technical Department Fort Belvoir, VA 22060-5426 POC: Lt. Col. Duffy Daugherty	C: (703) 664-5173 AV: 354-5173